Letters to the Editor

The Board of Editors will not hold itself responsible for opinions expressed in the letters published in this section. The notes containing reports of new work communicated for this section should not contain many figures and should not exceed 500 words in length. The contributions must reach the Assistant Editor not later than the 15th of the second month preceding that of the issue in which the letter is to appear. No proof will be sent to the author

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A NEW METHOD FOR MEASURING ABSOLUTE MAGNETIC SUSCEPTIBILITIES

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A coil carrying an electric current possesses a magnetic moment. If introduced in a magnetic field with its moment parallel to the field-direction, it will behave as a magnetic body. So, in a Curie-balance type set-up, if we place the sample inside the coil, then by adjusting the current, we can make the moment of the coil equal and opposite to the moment induced in the sample and the system will experience no translatory force.

The working formula can be shown to be

$$\chi = \frac{i - i_c}{i_s - i_c} \chi_s \left(\frac{K_a}{\rho_s} \right) \cdot \frac{m_s}{m} + \frac{K_a}{\rho}$$

where

χ = mass-susceptibility of the sample

ρ = density of the sample

m = mass of the sample.

χ_s, ρ_s and m_s are the respective values for a standard substance.

K_a = volume susceptibility of air

i = current necessary to balance the force on the sample

i_s = same with the standard substance

i_c = current necessary to balance the force on the coil alone.

It is better to have a calibration curve by working with a number of different samples of known susceptibilities.

The advantages of the method over the older method are :

(a) remote control eliminates manual rotation of torsion head, thus reducing the effects of vibration, etc.

(b) since the balancing force is applied directly on the sample itself, no torsion on the suspension fibre is required and the system remains perfectly undisturbed.

(c) electric currents can be very accurately measured.

(d) the balance chamber can easily be made vacuum-proof and can be kept dry.

The method has been tried experimentally and the instrument was found to work satisfactorily. Details will be published later.

My thanks are due to Professor A. Bose for his kind interest in the work.

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INTERMOLECULAR POTENTIALS OF H_2 AND D_2

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The importance of the quantum effects for H_2 and D_2 at low temperatures makes the determination of their potential energy functions very interesting. Further, it is likely to show whether their potential energy functions are the same, as it should be for two isotopes, provided their non-spherical nature may be neglected. Although it is known that there should be some difference in the inter-molecular potentials of H_2 and D_2 due to the difference in their zero-point energies, it was so long thought that this effect can be neglected (Mason and Rice, 1954). Moreover the earlier experimental data were not accurate enough to test this conclusively. Very recently Michels *et al.* (1960*a*) have determined the second and third virial coefficients of H_2 and D_2 by using a precise method (Michels *et al.* 1960*b*) utilising their compressibility data (Michels, et *al.* 1959) between the temperature range from $-175°C$ to $150°C$. They have observed that the force constants for H_2 and D_2 determined previously on the L–J (12 : 6) model cannot represent the virial data satisfactorily. Hence they have redetermined the force

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